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SOME NEW SPECIES OF WESTERN POLEMONIACEAE.

ALICE EASTWOOD.

Polemonium albiflorum, sp. nov.—Stems simple to the inflorescence or branched from the base, rather tall, glandular-hairy throughout: leaves with 11–15 lanceolate-acuminate, callous-tipped divisions, 2^{cm} long, 2–4^{mm} wide; petioles none or short on the lower cauline leaves; radical leaves not seen: inflorescence thyrsoid, the peduncles of the lower clusters longer than the leaves; bracts small, foliaceous; bractlets none: calyx 7^{mm} long, densely glandular on the outer surface, sparingly so on the inner; divisions about as long as the campanulate tube, obtuse or acute: corolla crateriform, white, 2^{cm} in diameter, the orbicular divisions twice as long as the tube, 6^{mm} wide, margin suberose: stamens exserted, the filaments 7^{mm} long with a hairy tuft at base, inserted 2^{mm} above the base of tube; anthers oblong, 4^{mm} long, mucronate: style and stigmas conspicuously exserted from the opening bud, stigmas about half as long as the style; ovary ovoid, containing several ovules.

This differs from *P. occidentale* Greene in the different shape of the corolla and the different leaves with leaflets confluent on the winged rachis. Perhaps it might be considered a form of *P. foliosissimum*, but the pubescence is much finer and the leaflets more like those of *P. filicinum* Greene, while the stamens and stigmas are exserted even in the bud, and the flower is larger.

We have three specimens from Utah in our collection, the type having been collected at Scofield by Mr. S. J. Harkness, June 29, 1902. No. 5601 Marcus E. Jones, collected on Soldier Summit at an altitude of 7300^{ft}, growing in gravel, and a specimen collected by Mrs. Willie C. Dodd are probably the same.

Polemonium californicum, sp. nov.—Caudex branched underground from a tap root and again at the surface: stems 10–15^{cm} high, sparingly pilose with lax, jointed hairs, viscid-glandular throughout, slightly angled, leafy only below the few flowering branches: radical leaves often as long as the entire plant, the leaflets rather distant, opposite or alternate, 21–23; rachis and

petiole slender, margined and ribbed, the petiole about one-third the entire length, gradually dilated to a sheathing membranous base; leaflets elliptical-ovate, obtuse or acute at apex, the base confluent with the rachis, generally acute and appearing petiolulate, the upper more distinctly confluent, somewhat oblique, 5–15^{mm} long, 3–7^{mm} wide; cauline leaves similar but with fewer leaflets and almost no petioles: flowers cymose in rather close clusters, erect in bud and flower; pedicels apparently flat, 2–5^{mm} long; bracts simple or with 3–5 divisions longer and more lanceolate than the leaflets: calyx tubular-campanulate, about 5^{mm} long, the linear-lanceolate acute segments twice as long as the tube, a little more than 1^{mm} wide: corolla blue, funnelform with spreading divisions; these oblong, truncate or emarginate, 5^{mm} long, 4^{mm} wide, glabrous or slightly pubescent; throat and tube about 3^{mm} long: stamens slightly unequal, the attached part of the filament densely woolly and forming a ridge in the corolla tube, the free portion 5^{mm} long; anthers white, elliptical, obtusely sagittate at base, almost 2^{mm} long, surpassing the corolla but not the stigmas; stigma lobes white, conspicuously exerted both in bud and flower; ovary oblong in outline, about 1^{mm} long: fruit not seen.

The type was collected by the author at Snow Flat on the old Tioga Road in the Yosemite National Park, in early July 1902. There are fine specimens also from Yosemite collected by Mr. F. T. Bioletti. There are specimens also from Summit, Placer county, collected by Dr. G. Eisen and later by the author. It seems to be the form included under *P. humile* Willd., common in the higher mountains of central California, and can always be distinguished from allied forms by the conspicuously exerted white stigmas and long radical leaves.

Polemonium calycinum, sp. nov.—Stems 10–20^{cm} high, pilose and viscid-glandular throughout, ribbed: radical leaves not quite equaling the stem, about 10^{cm} or less; rachis and petiole ribbed and margined, the latter about one-third the entire length, dilated and membranous at base; leaflets oblanceolate-obovate, 5–20^{mm} long, 3–5^{mm} wide, decurrent by the acute base, the three uppermost confluent, apex acute or callous-mucronate: flowers in short, close cymes, with entire or 3–5-foliate bracts; the bracts and divisions longer and narrower than those of the leaflets;

pedicels short: calyx about equaling the corolla, more than 7^{mm} long, the segments triangular-acute, as long as the tube, veiny: corolla funnelform, with the divisions spreading, orbicular-obovate, erosely denticulate, 5^{mm} long and wide, purplish-blue: stamens shorter than the corolla, the attached part very woolly, longer than the free portion, the latter 2^{mm}; anthers elliptical, 2.33^{mm} long, obtuse at apex and obtusely sagittate at base: pistil with style and stigma extending slightly beyond the calyx, exerted but little from the bud; ovary suborbicular.

This also comes in the aggregate under *P. humile* Willd. and is near *P. californicum*. It is peculiar in having a much larger calyx, shorter stamens and style, and leaflets differently shaped. The type was collected near Cinder Cone, Mount Lassen, California, by Mrs. C. C. Bruce, July 1897.

Polemonium tricolor, sp. nov.—Stems 10–15^{cm} high, apparently from running rootstocks; caudex clothed with broad chartaceous bases of old petioles; sparingly villous throughout with jointed hairs and glandular especially on the flowering stems: radical leaves erect, the rachis and petiole margined, strongly ribbed through the middle, 1^{mm} wide; petioles 2–4^{cm} long, dilated for almost half the length, reddish; leaflets 11–17, obovate or elliptical, callous-mucronate at apex, oblique and cuneate at base, confluent with the rachis, lowest alternate, upper opposite; cauline shorter and with shorter and broader petioles, the leaflets fewer, longer, and narrower: flowers in close, erect, compound cymes; buds erect; pedicels and peduncles flat, margined, viscid, 1–5^{mm} long; bracts simple or 3–5-foliate: calyx open-campanulate, rounded at base, 5^{mm} long, the triangular-obtuse segments half the entire length, densely glandular on both sides: corolla rotate-campanulate, violet with a reddish-purple spot near the base of the divisions, throat yellow; divisions suborbicular, emarginate at apex, 6^{mm} long, 5.5^{mm} wide, almost twice as long as the included tube; this glandular and ridged with the woolly adherent bases of the filaments: stamens with the free part of the filaments about 4^{mm} long; anthers white, elliptical, auriculate at base, obtuse, 1.5^{mm} long: ovary orbicular in outline; style not surpassing the calyx; stigmas 3–4, 3^{mm} long: capsule 3-valved, but not ripe in the type specimen.

The type is no. 1671 of the collection made by Harley P. Chandler on Marble Mountain, Siskiyou county, California, at an altitude of 8,000 ft. It was distributed as *P. humile pulchellum* Gray, and undoubtedly comes under that polymorphous aggregate. The small tricolored corolla with short tube distinguishes it easily from the other allied species or varieties.

Polemonium Berryi, sp. nov.—Caudex branched apparently from a tap root: stems slender, about 10^{cm} high, lower part sparingly glandular, upper part more densely clothed with short glandular pubescence: radical leaves clustered, the long ribbed petioles membranously dilated and imbricated at base, as long as the blades or longer, together 4–8^{cm}; leaflets imbricated before unfolding, later somewhat distant, 15–19, obovate to spatulate and rhomboid, acute or obtuse at apex, cuneate at base and confluent on the rachis, 2–4^{mm} long and about as wide, veinless and slightly viscid: cymes rather loosely flowered; the pedicels from shorter than the calyx to 7^{mm}; bracts trifoliate or entire and simple: calyx tubular-campanulate, 4^{mm} long, the deltoid-subulate obtuse divisions half as long, glandular-hairy on both sides: corolla white, tinged with lilac, throat yellow, tube white, funnel form, 9^{mm} long; the divisions obovate, rounded and entire at apex, 4^{mm} long, 3^{mm} wide: stamens inserted in the tube and attached by the hairy base, the free part glabrous, 4–5^{mm} long; anthers obtusely sagittate at base, retuse at apex, not quite 2^{mm} long, elliptical, the two cells attached half the length: pistil with style and stigma 8^{mm} long, the upper part of the stigma lobes exerted in the bud; ovary ellipsoidal, 3-valved, containing several ovules: fruit not seen.

This delicate little *Polemonium* is perhaps nearest to *P. viscosum* Nutt. It differs from the description of that species in the short, broad calyx divisions. The type was discovered in Desolation Valley, near Lake Tahoe, California, by Mr. S. Lucien Berry, in whose honor it is named, and was collected July 10, 1902. There is a specimen of what appears to be the same species in the herbarium of the California Academy of Sciences, collected by J. G. Lemmon near Lassen's Peak, June 1875, no. 26.

Polemonium Tevisii, sp. nov.—Rootstock somewhat shreddy, the upper part of caudex clothed with imbricated membranous petioles of old leaves: stems about 10^{cm} high, slightly angled, glaucous and almost glabrous at base, the upper part clothed with

short glandular hairs: radical leaves 6–8^{cm} long with 15–19 leaflets; petiole generally more than half the entire length, slender, slightly glandular, strongly ribbed and scarcely margined, membranously dilated at base; leaflets imbricate when young, orbicular to elliptical-ovate, acute at apex and base, confluent on the rachis, 1–6^{mm} long, 2–4^{mm} wide; cauline leaves subtending the flowering branches, with shorter petioles, the leaflets few, narrower and longer than on the radical leaves: flowers closely cymose on capillary pedicels, 2–5^{mm} long; bracts simple or trifoliate, similar to the cauline leaflets: calyx campanulate, 5^{mm} long, the linear-lanceolate divisions 3^{mm}, acute, glandular-hairy: corolla blue with yellow throat, funnellform, 9–10^{mm} long, the broad elliptical divisions 5^{mm} long, 4^{mm} wide, rounded and entire at apex: stamens inserted in the tube of the corolla, attached from below the throat to the base, hairy along the insertion and within the tube, the free part of the filaments 3–4^{mm} long; anthers elliptical, the cells united to below the middle, obtusely sagittate, obtuse at apex, 2^{mm} long, white: stigmas included in the bud, lobes 1.5^{mm} long; style 5.5^{mm} long; ovary elliptical in outline, acute at apex, with several ovules in each cell: fruit not seen.

The type was collected in Desolation Valley, near Lake Tahoe, California, July 10, 1902, by Mr. S. L. Berry; and in the same region by Lloyd P. Tevis, in whose honor it is named; and by Miss Lutie Goldstein at Lakeside Park, in the same region, July 1903.

Polemonium rotatum, sp. nov.—Cespitose from a thick twisted rootstock densely clothed with the persistent petioles of former leaves: stems slender, 10–15^{cm} high, striate, glandular-hairy, paniculately branching with erect branchlets: radical leaves 3–4^{cm} long, the blade equaling the petiole; leaflets about 15, generally alternate, elliptical, obtuse, oblique, sessile, 3–4^{mm} long, wrinkled but not veiny, sparingly clothed with glandular hairs; rachis and petiole glandular-hairy, keeled, the latter dilated at base; cauline leaves similar but short-petioled or sessile, the leaflets diminishing in number to the single entire bracts: flowers in erect panicles on short erect pedicels, as long as the calyx or longer: calyx campanulate, 4^{mm} long,

tinged with rose-color, broad at base, the divisions as long as the tube, oblong, obtuse, extending to the throat of the corolla: corolla rotate, with tube 2^{mm} long, throat saucer-shaped, and limb salverform; divisions orbicular, 7^{mm} in diameter; the entire limb about 16^{mm} in diameter: stamens inserted in the tube, unequal, none exceeding the petals; anthers oblong, obtusely sagittate at base, more than 2^{mm} long, obtuse at apex: style surpassing the stamens: capsule distinctly 3-lobed, with one seed in each cell: seeds concave on one side, 2^{mm} long, brown.

This was collected in the Klondyke, Yukon Territory, by John MacLean, in 1898-1901, and was distributed as *P. pulchellum* Bunge.

Polemonium fasciculatum, sp. nov.—Stems numerous from a caudex densely clothed with the broad membranous bases of old petioles, rather stout, glandular throughout with a crisp pubescence, 20^{cm} high, paniculately branched with the branchlets erect: radical leaves 5^{cm} long, with petioles one-third the entire length, membranously dilated half the length, striate; rachis broad and flat, ribbed; divisions alternate, distant, 17-21, sessile, orbicular, 2^{mm} in diameter; cauline leaves few, generally with branchlets in the axils, similar to the radical but shorter, with few distant divisions, almost sessile: flowers numerous, cymosely paniculate in close clusters, sometimes subumbellate; pedicels slender, shorter or longer than the calyx: calyx 5^{mm} long, cuneate at base; the divisions 3^{mm} long, oblong-lanceolate, obtuse, veiny, surpassing the throat and tube of the corolla: corolla blue, rotate, the tube 2.5^{mm} long, the throat and limb 13^{mm} in diameter; divisions obovate, truncate or retuse, 5^{mm} wide near the apex, 6^{mm} long: stamens inserted in the tube, hairy at base, somewhat unequal, shorter than the divisions of the corolla; anthers orbicular, 1^{mm} in diameter, united at the apex only: style surpassing the stamens, not so long as the corolla and not exerted from the bud: capsule 3-lobed, somewhat pointed: seeds 2-3 in each cell.

This was collected by Mr. John MacLean in 1898 or 1901 on the Klondyke, Yukon Territory, and was distributed as *P. pulchellum* Bunge. It is much nearer *P. viscosum* Nutt.

Linanthus croceus, sp. nov.—Stems generally several from an annual root, slender, 10-20^{cm} high, hispid with a white pubescence

appressed on the stems, spreading on the leaves, bracts, and flowers: leaves opposite, palmately divided generally into six spatulate or linear-acute segments, 3–7^{mm} long on the lower stem and almost twice as long near the flowers, appearing as if whorled with the internodes lengthening with age, in the young plants scarcely longer than the leaves: bracts of the terminal head of flowers as long as the calyx, palmately divided into five linear-acuminate divisions 7^{mm} long, 1^{mm} or less wide, the inner surface glabrous but the outer surface and involute margins hispid: divisions of the calyx twice as long as the cuneate tube, linear-subulate, aristate with pubescence similar to that of the bracts: corolla yellow, the tube filiform, 4–5^{cm} long, clothed with fine scattered spreading jointed hairs; throat broadly funnel-form, expanding to the limb which is 1.5^{cm} across, with the divisions suborbicular, 5^{mm} wide, rounded at apex, generally with two faint lilac dots at base, sometimes the outer part of the lobes tinged with rose or lilac: stamens on capillary filaments, exserted, inserted at the base of the throat, 4^{mm} long; anthers yellow or orange, narrowly elliptical, a little more than 1^{mm} long: stigmas surpassing the stamens, 3^{mm} long; ovary with few ovules: fruit not seen.

This beautiful species was collected by the author May 9, 1901, near Pt. San Pedro, San Mateo county, California. It covered the ground for several acres, but was seen in no other place, and is probably a strictly local species. It is perhaps the most strikingly beautiful species of the group where it belongs, with the long threadlike tubes of the corolla supporting the wonderfully beautiful yellow disks. The great masses almost monopolized the ground. The species is well worthy of a place in the gardens, and would do well under the same conditions as its near relative *L. androsaceus*, from which it differs not only in color but also in leaves, shape and size of flower, and pubescence.

Linanthus Plaskettii, sp. nov.—Branching diffusely from an annual tap root and also above; the numerous stems slender, often reddish and cinereous with a scabrous, hispid pubescence: leaves opposite, digitately divided, appearing verticillate, spatulate, scabrous-ciliate or somewhat serrate with aristate teeth, 3–8^{mm} long, surface grooved between the midrib and the thick margins, somewhat scabrous especially near the apex and on the margins, appearing serrulate-aristate, the apex bristle-tipped:

involucral leaves linear, very hispid, scarcely distinguishable from the calyx divisions: calyx 8^{mm} long, keeled below each sinus, the division attenuate to a long stiff point a little more than half as long as the turbinate tube, bristly hispid with short, spreading, stiff-jointed hairs: tube of corolla filiform with pubescence similar to the calyx, exerted about 2.5^{cm}, the throat saucer-shaped, purple or brownish, the limb lilac, white or rose, 1^{cm} in diameter; divisions obovate, obtuse: stamens inserted in the throat of the corolla, with capillary filaments as long as the style: stigmas surpassing the anthers but not extending beyond the petals.

This is near *L. androsaceus* Greene, of which it may prove only a geographical variety. It differs in shorter, more pointed leaves, scabrous and glandular pubescence, flowers with more slender corolla tube, in which character it resembles *L. parviflorus* Greene. The stems are more numerous and more leafy, and the general appearance suggests a different plant.

The type is no. 90 of the collection of Mr. R. A. Plaskett from the Santa Lucia Mountains, collected April 11, 1898. It has also been collected by the author on the Milpitas Ranch in the San Antonio Valley, Monterey county, a part of the same mountain system.

Navarretia Bowmanae, sp. nov.—Stems simple or branched, often reddish, scabrous and cinereous with a fine, close, glandular pubescence, erect or spreading, 10–20^{cm} high: leaves bipinnately divided, the main divisions alternate or opposite, 7–15; ultimate and lowest divisions narrowly linear, less than 0.5^{mm}, spinescent at apex; rachis strongly ribbed, the distinction between it and the petiole not evident, the latter broadening at base, wanting on the upper leaves, varying much in length on the lower; blade and petiole on lower leaves about 7^{cm} long, on uppermost 1–2^{cm}; flowers lemon-yellow, in heads at the ends of the branches, 1–2^{cm} broad, surrounded at base by involucral leaves; bracts broadly ovate in outline, white-woolly near the base and glandular throughout, 7^{mm} long, 1^{cm} wide: calyx tube white, chartaceous, glandular, narrowly turbinate, ribbed, 4^{mm} long; divisions 3–5, unequal, aristate two longer than the others, corolla tube shorter than the longest divisions of the calyx, slightly glandular, throat funnelform, the limb consisting of 4–6 linear-oblong, obtuse lobes, 3^{mm} long, 1.5^{mm} wide: filaments inserted between the lobes and shorter, as long as the anthers: style extending 3^{mm}

beyond the petals, conspicuously exerted even in the bud; stigmas small; ovary with one ovule in each cell.

This is related to *N. cotulaefolia* H. & A., to which it may be too closely allied. It is distinguished from this species, as I know it, by the glandular scabrous pubescence of stem and leaves, the woolly pubescence of bracts and calyx, the yellow corollas, the short stamens, and the conspicuously exerted style. It was collected at Anderson's Ranch, Lower Lake, Lake county, California, May 11, 1901, by Miss Agnes Bowman, in whose honor it is named. Heller's 5638 and 5432 appear to be the same. These were distributed as *N. cotulaefolia* H. & A.

Navarretia pterosperma, sp. nov.—Stems simple, low, 5–6^{cm} high, glandular pubescent and slightly villous-arachnoid: cauline leaves pinnatifid with 5–7 linear-acerose divisions almost as wide as the rachis; lower ones petioled, upper sessile and with the lower divisions again divided: heads small, about 1.5^{cm} broad, with the bracts broadly ovate in outline, once or twice deeply pinnatifid, the divisions linear-acerose, arachnoid on the margins (with a good lens): calyx 1^{cm} long, of five unequal, narrowly linear, acerose divisions, twice as long as the tube, which is thin and membranous between the stout ribs: corolla blue, with tube 7^{mm} long, narrowest at the middle below the insertion of the stamens, dilated to a base as broad as the funnel-form throat; divisions 2.5^{mm} long, 1^{mm} wide, oblong, obtuse, entire, surpassing the calyx: stamens unequally inserted on short filaments, included, not reaching the throat of the corolla; anthers white: style short, with short divisions: capsule with thin walls through which the brown seeds can be seen: seeds flat, oblong or orbicular, winged, 1^{mm} in diameter, without spiracles or mucilage when wet, about five in each cell.

This is a rare species on Bodega Point, California, or it was late in the season, for few specimens were found growing amid the grass on the bluffs above the bay. It was collected July 4, 1900.

It is near *N. mellita* Greene, but has larger flowers, bracts less arachnoid and more dissected and larger, and seeds more distinctly winged. I noticed no odor about this plant when it was fresh, and there is none in the dried state. *N. mellita* does not lose its odor even when dry, and when the dried plants have been wet the odor is quite noticeable.

Gilia collina, sp. nov.—Stems branching, 15^{cm} high; lower part leafy, more or less clothed with cottony wool; inflores-

cence dotted with black or white stipitate glands: leaves lanceolate in outline, pinnately parted with 9–15 short divisions, the lobes or teeth of which are aristate; lowest divisions shortest, becoming tooth-like; rachis and petiole margined, the latter longest on the lowest leaves but not equaling the blade, together 1–3^{cm} long, 1^{mm} wide; upper leaves sessile: panicle loosely branching from above the leaves, more than half the height of the entire plant; bracts small and appressed to the stem, subulate; pedicels varying much in length: calyx 3^{mm} long, with five green or purplish-dotted ribs alternating with white membranous folds, the tube as long as the subulate-aristate teeth, ribs glandular: corolla pink, the tube 1.4^{cm} long, glandular, widening at base and throat; the divisions narrowly obovate, obtuse, margins entire or crisped: stamens inserted in the funnelform throat, with unequal filaments shorter than the petals; anthers small, orbicular: style surpassing the petals; stigmas hairy on the inner side; ovary with two ovules in each cell: capsule obovate to elliptical, 14^{mm} long, yellow, not all ovules maturing: seeds flat, elliptical, margined, becoming mucilaginous when wet.

This well-marked species belongs near *G. tenuifolia* Benth. and *G. inconspicua* Dougl. It differs from both in shape of leaves, and size and form of flower, having corollas with much longer tubes than any of the group. It was collected on a mountain near Hockett Meadows, Tulare county, California, by C. A. Purpus, June 1896, being no. 1783 of his collection. According to Mr. Purpus, it is found in openings under the trees in forests of *Pinus Jeffreyi*. It is common on gravelly hills on Hindman's Trail to Coyote Pass in the same region, where it was collected by the author July 1903.

***Gilia pedunculata*, sp. nov.**—Stems diffusely branching with many slender stems, 10–30^{cm} high, upper part sparingly glandular and with a few scattered woolly hairs especially near the base of stem and in axils of leaves: leaves once or twice pinnately divided with 3–7 narrowly oblanceolate or filiform leaflets, the lower petioled, the upper sessile; peduncles filiform, axillary, 1–3-flowered, naked, 3–10^{cm} long: calyx 5^{mm} long, the subulate-acuminate divisions 3^{mm} long, the greenish or purplish midvein 3-nerved, the membranous margins and intermediate folds purplish-dotted, sparingly lanose: corolla blue, tubular-funnelform, the tube

barely exserted, 5^{mm} long; the divisions oval, acute, 3^{mm} long; stamens inserted at the sinus, on filaments shorter than the anthers, less than 1^{mm}: style included in the tube, the stigmas extending to the throat: capsule surpassed but little by the divisions of the calyx, elliptical in outline, dotted with purple at summit, mucronate, glabrous: seeds several in each cell with trace of a white wing at some of the obtuse angles.

The type of this species was collected by the author on Alamo Creek, not far from Santa Maria, Santa Barbara county, California, May 24, 1896. It belongs to the same group as *G. millefoliata*, from which it differs in the less dissected leaves, more diffusely branching stem, longer and mostly one-flowered peduncles, and thick seeds. It presents quite a different appearance and seems peculiar to the southern part of San Luis Obispo county and northern Santa Barbara. There is a specimen from Santa Margarita and another from the Suey Ranch in the same general region collected also by the author.

GILIA PEDUNCULATA minima, var. nov.—Similar to the preceding in every way, but flowers and fruits less than half as large, and whole plant smaller.

Collected at Cuyama, May 5, 1896.

GILIA PEDUNCULATA calycina, var. nov.—Distinguished from the typical form by the smaller flowers, corolla tube constricted near the middle, and narrower calyx divisions conspicuously attenuate and green and surpassing the ripe capsule.

Collected by the author between Huasna and Pozo, San Luis Obispo county, June 15, 1902.

GILIA CALIFORNICA glandulosa, var. nov.—Differs from the typical form in the more crowded fascicles of leaves clothed with arachnoid-glandular hairs, and in the tomentose stems.

It is the common form growing around Pasadena, California. There are specimens in the Herbarium of the California Academy of Sciences from Mount Wilson, collected June 1903 by Fordyce Grinnell Jr.; from La Cañada Cañon by Miss Lulu Forbes; and from Arroyo Seco by Miss M. E. Parsons; also in the Sierra Santa Monica by J. C. Nevin.

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